DOCUMENT RESUME

ED 286 657 PS 016 889

AUTHOR Lawton, Joseph T.; Fowell, Nancy
TITLE A Description of Teacher and Child Language in Two Preschool Programs.
PUB DATE Apr 87
NOTE 34p.; Paper presented at the Annual Meeting of the American Educational Research Association (Washington, DC, April 20-24, 1987).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Child Language; *Classroom Communication; Classroom Research; Communication Research; *Communication Skills; Comparative Analysis; Comprehension; Learning Theories; *Oral Language; Piagetian Theory; Preschool Children; Preschool Education; *Preschool Teachers; Questioning Techniques; Teacher Student Relationship; Videotape Recordings
IDENTIFIERS Ausubel (David P); Teacher Language; *Theoretical Orientation

ABSTRACT

This descriptive study compared language used by teachers and children in Ausubelian and Piagetian preschool programs during small group instruction and related learning activities. Instruction in the Ausubelian program (AP) was based on Ausubel's subsumption theory of learning while that in the Piagetian program (PP) was based on Piaget's theory of development. During one school year, 44 small group sessions were videotaped. Videotapes were coded for speaker, listener, category of utterances, reference to process or content, general or specific informational content, and correctly performed operations. Compared to teachers in the AP, teachers in the PP used questions more frequently than statements. Both groups of teachers more frequently used closed rather than open-ended questions. AP teachers and children referred more frequently than their counterparts in the PP to process rather than content. Children in the AP more frequently verbalized correctly performed mental operations than did children in the PP. Teachers in the PP employed consistent verbal strategies across tasks, whereas AP teachers varied their use of language by task. Comparison of results to findings of a concurrent study of children's improved understanding of logical concepts following instruction indicated that children in the AP performed significantly better than those in the PP. This appears to be an effect of the more frequent use of process language by teachers and children in the AP. (Author/RH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED286657

A Description of Teacher and Child Language in Two Preschool Programs[1]

Joseph T. Lawton
University of Wisconsin-Madison
and
Nancy Fowell
University of Wisconsin-Whitewater

1987

Dr. Joseph T. Lawton
School of Family Resources & Consumer Sciences
Dept. of Child and Family Studies
University of Wisconsin
1430 Linden Drive
Madison, WI 53706
(608) 263-2353

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Joseph T. Lawton
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PS 016889

BEST COPY AVAILABLE

Abstract

This descriptive study focuses on language used by teachers and children in two preschool programs during small group instruction and related learning activities. Instruction in the Ausubelian program (AP) was based on Ausubel's subsumption theory of learning while that in the Piagetian program (PP) was based on Piaget's theory of development. During one school year, 44 small group sessions were videotaped, 22 in each program. Videotapes were coded for speaker, listener, category of utterances, reference to process or content, to general or specific information, and to correctly performed operations. Compared to teachers in the AP, teachers in the PP used questions more frequently than statements, and both groups of teachers more frequently used closed rather than open-ended questions. Both AP teachers and children referred more frequently to process than content than was the case for their counterparts in the PP. Children in the AP more frequently verbalized correctly performed mental operations than did children in the PP. Teachers in the PP employed consistent verbal strategies across tasks, whereas AP teachers varied their use of language by task. A comparison was made of the results of this study to those from a concurrently running study of children's improved understanding of logical concepts (process) following instruction. The fact that children in the AP performed significantly better than PP children on such tasks appears to be related to the more frequent use of language associated with process by both teachers and children in the AP.

A Description of Teacher and Child Language in Two Preschool Programs During Small Group Instruction

This study examined particular types and frequencies of verbalization employed by teachers and young children during small group instruction in two preschools that differed in theoretical underpinnings to the program, namely an Ausubelian and Piagetian program (Lawton, 1987a; Lawton, Hooper, Saunders, & Roth, 1984). The study was included as part of a longitudinal study of the effects of instruction on preschool children's development of logical concepts (Lawton, 1987b) in an attempt to identify a possible reciprocity between language used in instruction and learning outcomes in terms of an improved understanding of logical concepts (essentially classification, relations, and conservation).

Mention is made here, first of pertinent research on the use of language in the preschool classroom, and second the relative merits of different types of preschool programs. This is followed by a brief description of the two preschool programs used in this study.

Language Use in Preschool Classrooms

There has been considerable research on vebal interactions in the classroom. Studies pertaining to the importance of classroom questions precede all others.

Use of Questions during Instruction

Whereas classroom questions were initially used by teachers mainly to stimulate recall of learned content and to check for attention, during the 1950's there was a gradual shift in emphasis to use questions as a devise for stimulating children's thinking skills; that is, process (Hunkins, 1972). Taba and Elzey (1964) used a multiple coding scheme to evaluate the impact of teachers' use of language on children's levels of thinking. Taba concluded that, *"questions can serve to lift the level of thought in the learning process"* (Taba, 1967, p. 122). It was found by Crump (1970) that teachers instructed in the use of various types of questions were more likely to increase their selection of questions associated with higher cognitive levels of thinking, such as questions associated with discovery vesus recall, with divergent versus convergent thinking, or with application and evaluation versus memory and translation.

Various studies with young children have provided data suggesting that: (1) teachers employing a process versus content curriculum used significantly more perceptual questions,

though teachers in both programs used few questions requiring divergent thinking (Zimmerman & Bergan, 1971); (2) teachers using an elaborative versus non-elaborative form of teaching used questions and statements that elicited from children more frequent use of elaborative responses and significantly improved performance on tasks requiring verbalization (Smothergil, Olson, & Moore, 1971); (3) children's level of complexity of response is associated with the complexity level of posed questions (Blank et al., 1978).

Sigel and Saunders (1979) justify the use of enquiry techniques of instruction and learning in early childhood programs on the basis of cognitive demands that can be made on children by teachers' questions. Children's responses are expected to vary as a function of the open and closed dimension of a question. While both open and closed questions require the child to decide what and how much to say, open questions may force the child to choose from many options. Open questions, "function as instigators, activators, and organizers of mental operations" (Sigel & Cocking, 1977, p. 216).

There have been few studies dealing with teacher-child verbal interactions. Results have indicated that: (1) questions have a "demand quality" understood by young children, the probability of a "next" question occuring in a sequence of questions is high, and that this is more likely to occur for adult rather than child initiated questioning (Mishler, 1975a); (2) adults extend conversation by means of successive related questions but children use questions mainly to elicit information (Mishler, 1975b); and (3) teachers tend to evaluate responses to questions and frequently ask questions aimed at evaluating children's progress (Mehan, 1979).

Other studies of general language use in early childhood program classrooms have indicated that preschoolers adjust their speech according to the perceived abilities of different aged listeners (Shatz & Gelman, 1973), young children tend to ask direct questions (Garvey, 1974), and as children grow older they begin to use various ways of asking about action and for information, and will pursue unsuccessful requests for information more persistently than requests about action (Cherry-Wilkinson, Clevenger, & Dollaghan , 1981). Cooper (1979) found that in teacher-directed, as compared to child-directed, learning situations, children's verbalizations increased and their language contained complex forms of inquiry and informing. The role of the teacher in facilitating children's speech was clearly shown. From observations of teacher and child

verbal behaviors in a Piagetian and Ausubelian classroom, Johnson and Wànska (1978) concluded that program model, rather than teachers' beliefs about early development and preferred classroom communication strategies, may predict the type of teacher verbalizations used. Finally it has been observed that preschool teachers tend to speak more frequently to boys than to girls (Cherry, 1975).

Relative Merits of Different Types of Preschool Programs

Over the past 20 years, a number of investigators have examined the relative merits of various preschool classroom models. One important finding which has emerged from these comparative studies is that early educational models, based upon diverse theoretical perspectives regarding the development and education of young children, tend to result in differential outcomes for children (Banta, 1972; Karnes, 1973; Lawton, Hooper, Saunders, & Roth, 1984; Miller & Dyer, 1975). Researchers, however, are usually unable to identify precisely the specific program features associated with the varying effects upon children. For example, in a study comparing the effects of four Head Start programs upon children of middle school age, Miller and Bizzel (1983) found the best performing group to be boys exposed to an early Montessori classroom. Regarding the exact nature of the Montessori experiences which proved beneficial to the disadvantaged boys, these researchers write, "At present, we are only able to speculate" (p. 739).

One important and salient feature of instruction that might be expected to strongly influence children's learning is, of course, language. Teacher behavior (including the use of language) affects the child and child behavior, in turn, influences teacher behavior (Mehan, 1979; Mishler, 1975a, 1975b). It can also be expected that the language used by teachers during instruction (to include teacher-child verbal interactions) will differ by program in accord with teachers basic philosophical and theoretical orientations towards instruction and learning. However, it is rare to find studies where comparisons of different early childhood program models are made that include observations and assessment of teacher and a child classroom behavior. It is more usual to find that comparisons are made on the basis of outcome measures of children's performance on various tasks (e.g., Bingham-Newman, Saunders, & Hooper, 1974; Lawton, Hooper, Saunders, & Roth, 1984; Weikart, Epstein, Schweinhart, & Bond, 1978; Zimmerman & Rosenthal, 1974). It has been noted that little is known about the role of language in instruction and as a medium of

exchange between teacher and child (Blank, Rose, & Berlin, 1978). Language is an important and salient feature of instruction and learning in early childhood programs. The present study is an attempt to address one issue of teacher-child interactions by identifying the types and frequencies of naturally occuring teacher-child verbalizations and relating this information to children's learning achievements as an outcome of verbal instruction and exchange. The examination of language used by teachers and chidlren occurred during small group instruction and related learning activities aimed at facilitating young children's development of logical concepts.

Two Preschool Programs

It is only possible here to provide brief descriptions of the two preschool programs used in this study. Lengthier descriptions can be found in Lawton (1987a), Lawton, Hooper, Saunders, and Roth (1984), Ershler, McAllister, and Saunders (1977).

The Ausubelian Program

The Ausubelian Program (AP) emphasized expository teaching and subsumption learning as advocated by Ausubel (Ausubel, Novak, & Hanesian, 1978). General subject matter, concepts, and high-order skills (e.g., hierarchical classification) when learned first, are believed to provide potential subsumers for subsequent learning of related more particular information. General concepts and high-order skills are presented first in what are called "advance organizer lessons" (AO). An AO is immediately followed by "related learning activities" (RA). At this time, children spontaneously or through direction from the teacher begin to recognize the relationship of subordinate concepts and particular information to the general concepts previously learned. This sequence of learning also applies to the learning of high-order and related sub-skills. This sequence of learning is referred to as "progressive discrimination" and is expected to result in the meaningful learning of general concepts and high-order skills. What is likely to be retained longest in memory, and therefore available for future use when the occasion demands, are the general concepts and high-order skills.

The teaching of general concepts and high order skills occured with small groups of five children. General concepts (such as mammal, sharing) were at first taught separately from high-order skills (e.g., multiple sorting, hierarchical classification), but fairly quickly the relationship between the high-order (information processing) skills and the learning of general

concepts was indicated to children.

The Piagetian Program

Implications of Piaget's theory of development for preschool education have been variously interpreted (e.g., Copple, Sigel, & Saunders, 1979; Forman & Hill, 1980; Forman & Kuschner, 1977; Hohmann, Banet, & Weikart, 1979; Johnson & Hooper, 1982; Kamii & DeVries, 1977, 1978). The Piagetian program (PP) used in this study (Ershler et al., 1977; Lawton et al., 1984) placed the emphasis upon the child as an active learner, one who acts upon information, incorporating it into an organized framework of knowledge. This interactive process was believed to be facilitated by a stimulating environment in which the autonomous child may explore, manipulate, discover, and invent. In general, in order to promote children's exploration of objects and events, teachers endorsed indirect teaching strategies. Their intent was to facilitate the process of thinking for their pupils, rather than to stress the acquisition of information and skills.

In small groups of five, children were encouraged to consider the processes of classification, seriation, number, conservation, measurement, space, time, and representation. Each session included small group instructional time, and related activities, but not necessarily in that order.

These two programs were similar in that they aimed to facilitate an improvement of the understanding of logical concepts in young children. They clearly differed with respect to instructional procedures. In both programs, during small group instruction and related learning activities, there was a considerable use of language by teachers and children; essentially, different types of questions and statements, that are defined in a following section. We were interested in obtaining indices of the type and amount of utterances used in connection with instruction in both programs and, also, whether there was any suggestion that language use might be related to any gains in logical concept learning.

A number of predictions about teachers' and children's verbalizations were formulated based on expectations of classroom language use during small group instruction and related learning activities derived from descriptions of program objectives and organization provided by teachers in the AP and PP programs, and from other associated literature describing these two programs (e.g., Lawton, 1987a; Lawton et al., 1984; Ershler, McAllister, & Saunders, 1977). These predictions are indicated in Table 1.

Insert Table 1 about here

The essential differences referred to in this list of predictions of types of verbalizations it was expected that teachers and children would use in each of the two programs can be summarized as follows:

1. That compared to teachers in the AP, teachers in the PP would ask more questions than make statements (except during RLA), and that their questions and statements would more likely be indirect than direct and open than closed.
2. That compared to AP teachers, teachers in the PP would refer more to specific than to general information.
3. That AP teachers would ask more questions during RLA than during SGI, and that their questions were more likely to be direct than indirect and more likely to be closed than open.
4. That compared to PP teachers, AP teachers would more frequently refer to process than to content.
5. That compared to children in the PP program, AP children would more frequently refer to process than to content.
6. That compared to PP children, AP children during RLA would ask more questions and make more statements referring to general rather than to specific information.

Method

Sample

Eighteen children were enrolled in the Ausubelian program and seventeen in the Piagetian program. Selection of program was by parental choice and on a first come first enrolled basis. Enrollment, therefore, as for any preschool program, was not through random selection. However, there was nothing to suggest from the characteristics of these children that they were not unlike the majority of children with similar backgrounds and at a similar level of intellectual development on entry into preschool. Ten children from each program (five boys and five girls in the PP and six girls and four boys in the LP) were selected at random to participate in the study. Families of the children were middle class and of mixed ethnic origin. Sample characteristics are

shown in Table 1. It was determined that the two groups of children did not differ from each other by chronological age or by verbal intelligence as measured by the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981).

Insert Table 2 about here

Procedure

For each preschool, 22 small group sessions were videotaped over a period of time extending from late September to early May in a single school year. The length of individual videotapes varied from 22 to 30 minutes with a mean of 28.83 minutes. An effort was made to space the videotaped sessions evenly across the school year by filming 11 sessions per program per semester.

All videotaping took place in a particular classroom, regularly used for small group instruction by both preschools. The second author of this paper videotaped all 48 sessions.

Variables

Since the intent was to obtain language data which would reflect preschool method differences, the decision was made to focus only upon that part of classroom speech which was related to the small group instructional topic. Thus, the first decision made regarding each verbalization was whether or not it pertained to the lesson as characterized by the teacher on her written lesson plan. Although pertinence was broadly interpreted, only topic-related utterances were coded into categories. Each codeable verbalization was determined to be: (1) a question or statement, (2) about content or about process, and (3) general or specific in nature. A number of sub-classifications were then made. Questions were designated as direct or indirect in accordance with a taxonomy of questions devised by Kearsley (1976). Statements were also subcategorized in accordance with types of statements identified by Mann (1974). Descriptions of categories of verbalizations are provided in Table 3.

Insert Table 3 about here

In addition, it should be noted that every process utterance was designated either as a performed process operation or as talk about process. An example pertaining to the process of ordering follows.

Teacher: *"What should Goldilocks do next?"*

This is a question about the sequential order of events, but the teacher herself has not ordered events. This is process talk.

"Did she run to the bedroom after tasting the porridge?"

This is also a question about sequence, but here the teacher has ordered events. An operation was performed.

Child: *"She eats the porridge first and then she goes and tries the chairs and then she goes upstairs."*

The child correctly ordered events; an operation was performed.

The differentiation between process talk and performed operation was made for all six subcategories of process speech.

Coding

Verbal utterances by teachers and children were coded from each videotape by the second author of this paper. The code sheets used (see Table 4) allowed space for 80 consecutive utterances. The example provided in Table 4 is reduced in size. The vertical space allotted to one utterance is referred to as a "frame". Each frame provided space to code one teacher utterance (upper half of frame) and one child utterance (lower half of frame). Beneath each teacher utterance was recorded the initials of the child to whom the teacher spoke. Beneath each child utterance two sets of initials were recorded, the upper initials indicating the child speaker and the lower initials indicating the child or teacher being addressed. Each half-frame allowed an uttrance to be coded as

question or statement, about content or process, and either general or specific, and according to sub-categories. Since it was not always possible from the videotapes to detect exactly the face or voice of a speaker, coders relied on textual cues when making speaker-recipient decisions (Cherry-Wilkinson et al., 1981).

Insert Table 4 about here

Reliability of Coding

Two students, with no knowledge of the study, were trained by the primary coder. After reaching 95% agreement with the primary coder on two segments of 100 sequential utterances, from videotapes not used in this study, they began to code tapes independently. The percent agreement for each variable within the verbal sequence was determined using four randomly chosen videotapes, two per coder. The formula:

$$\frac{\text{AGREEMENT}}{\text{AGREEMENT} + \text{DISAGREEMENT}} \times 100$$

was employed and the results are shown in Table 5. In cases where the frequency of occurance for a specific variable was less than ten across the four tapes, the variable was omitted from Table 5. Variables omitted from Table 5 and from further analysis were indirect questions, reminding questions, indefinite statements, and reminding statements. The process of conservation, also omitted from Table 5, was placed in the "other processes" category, along with reading and counting (C/R/C) for statistical analysis.

Insert Table 5 about here

Validity

The findings are presumed to generalize to the particular classrooms under study. External validity is less assured. Activities engaged in by teachers and children in the schools sampled are, however, probably much like those which occur in other preschools which emphasize cognitive, as

well as physical and social, development. A factor which may limit the ability to generalize findings from the present study to other classrooms is that only two preschool programs were observed.

Results

The study was largely descriptive. Cross-tabulation tables showing frequencies of teachers' and children's verbalizations for all categories of coded speech and for each preschool are reported here. Table 6 reports whole session data, and Table 7 report data from the two components of a whole session, small group instruction (SGI), and related learning activities (RLA), respectively.

Insert Tables 6 & 7 about here

Whole Session Data

From Table 6 it can be seen that, of all verbalizations by Ausubelian Program Teachers (APT), more than half were questions (57%) compared to statements (43%), which does not support the prediction. As predicted, these teachers did ask more direct (57%) than indirect questions (0%), made more direct (41%) than indirect statements (1%), referred more frequently to process (61%) than to content (39%), and spoke significantly more frequently to boys than to girls ($f[1,10] = 5.74$, $p<.01$). Surprisingly, however, they referred more frequently to specific rather than to general information. The general information category should have included subordinate concepts as well as superordinate concepts. Unfortunately the code used did not distinguish between these two levels of abstraction. In reality, more reference to general than specific information may have occurred.

Children, as predicted, made statements (95%) more frequently than they asked questions (5%). As can be seen, they asked few questions but as expected these were direct. As predicted, children's statements were direct (95%) rather than indirect (0%), they referred more to specific (100%) than to general information (0%), and they spoke more about process (72%) than about content (28%).

The prediction that Piagetian Program Teachers (PPT) would formulate questions more frequently than make statements was supported (64% versus 36%). However, contrary to

expectations, these teachers asked direct (63%) rather than indirect questions (0%) and made direct statements (34%) more frequently than indirect statements (2%). Because teachers in this program stated that instruction and learning proceeded from the specific to the general, from the simple to the complex, it was predicted that they would refer more frequently to specific rather than to general information, and this was the case (100% versus 0%). Surprisingly, they referred much more frequently to content (64%) than to process (36%). Although PPT spoke rather more frequently to boys than to girls (39% versus 33%), this difference was not significant and, therefore, this prediction is unsupported.

The verbalizations of PPC (Table 6) were, essentially, as predicted and the pattern of verbalizations was very similar to that of APC, except in one important regard. As predicted PPC spoke less frequently of process than content (36% versus 64%) The reason why this was predicted to be so needs a brief explanation here. In the PP an emphasis was placed on encouraging children to consider content, to encourage children in becoming enthusiastic about a wide variety of interesting and stimulating learning materials. It is also true to say that these children were also encouraged to consider relationships among and between objects. There was no pressure placed on children by their teachers to process information in paticular ways, even though during small group instruction teachers did refer to the possibilities of classifying and seriating objects, and of considering the effects of change on a particular property of an object. Therefore, it was expected that these children would be likely to pay more attention to content (learning materials) than to those logical concepts that we refer to here as information processing skills.

A number of comparisons need to be made between certain types of verbalizations used in each program. First, unexpectedly, there was no significant difference between the proportions of questions and statements used by teachers in each program, nor was there any significant difference between the proportions of direct-open and direct-closed questions used by AP and PP teachers. Second, compared to PPT, teachers in the AP spoke significantly more frequently of process than content ($X^2 = 15.5$, $p<.001$). Third, there was no significant difference between the proportions of questions and statements used by children in each program. Finally, like their teachers, APC spoke more frequently of process than content and, compared to such verbalizations by PPC, this use was significantly different ($X^2 = 28.2$, $p<.001$).

Small Group Instruction (SGI) and Related Learning Activities (RLA)

In referring to the use of vebalizations by category and subcategory during SGI and RLA, and in comparing the use of verbalizations within each program at these times, only unsupported predictions, important changes in useage from SGI to RLA, and significant differences in usage between programs will be mentioned. Data mentioned can be found in Table 7.

Teachers in the AP asked more questions during RLA than during SGI (66% versus 45%). The difference in the proportion of questions and statements used during SGI compared to RLA (45% and 55% versus 66% and 34%) was significant ($X^2 = 8.92$, $p<.01$). The expectation that these teachers would refer more to general than to specific information during SGI was not supported, but the expectation that they would more frequently refer to specific information during RLA was supported. Although it had been expected that children in the AP would ask more questions during RLA than during SGI this was not the case.

Teachers in the PP referred less frequently to process than to content during SGI (46% versus 54%) and this was moreso the case during RLA (25% versus 75%) with the difference being significant ($X^2 = 9.4$, $p<.01$). This was also true for PPC (SGI: 49% versus 51%; RLA: 27% versus 73%), the difference being significant ($X^2 = 10.2$, $p<.01$).

Comparisons

Only during SGI was the proportion of questions asked and statements made by PPT significantly different than the proportions used by APT (63% and 37% versus 45% and 55%: $X^2 = 6.52$, $p<.01$). Children in the PP did ask questions rather than make statements significantly more frequently than APC during both SGI and RLA (SGI: $X^2 = 4.9$, $p<.05$; RLA: $X^2 = 4.00$, $p<.05$). Compared to teachers in the PP, both during SGI and RLA, APT spoke significantly more frequently of process than content (SGI: $X^2 = 3.92$, $p<.05$; RLA: $X^2 = 27.6$, $p<.001$). This was also the case for the APC compared to the PPC (SGI: $X^2 = 19.5$, $p<.001$; RLA: $X^2 = 36.6$, $p<.001$).

On a final note, it is important to mention that AP children referred significantly more frequently to successfully peformed process operations than did children in the PP ($F[1,10] = 9.83$, $p<.003$).

Summary of Teacher's and Children's Patterns of Speech

The Ausubelian Program

Because they engaged in direct instruction, teachers in the AP were expected to frequently use descriptive statements, especially during small group instruction. The data support this expectation. However, it is also clear from the data that these teachers also frequently asked questions. From observation of the tapes it is apparent that questions were used, as might be expected, to involve children in thinking about and responding to questions about the properties of objects that exemplified the basic concept(s) being presented, and about procedures for manipulating objects. In this way, children became actively involved in the small group session. Questions were also asked by the teacher to evaluate children's understanding of concepts and rules for manipulating objects. During RLA, teachers used questions more frequently than they made statements. They asked considerably more questions during RLA (66%) than during SGI (45%). These questions were used primarily to query children about the properties of concepts and about procedures for manipulating objects related to the demands of particular learning activities. This pattern of use of questions and statements was expected based on teachers stated objectives for SGI and RLA.

Teachers placed a special emphasis on process in their verbalizations during both SGI and RLA. This is a most important feature of these teacher's instructional method since it is related to a basic objective of the AP; namely, to instruct children in logical concepts as information processing skills. A related objective was to explain to children the use of these skills in processing the subject-matter concepts that were part of the curriculum (Lawton, 1987 a and b; Lawton et al., 1984). Teachers in the AP were expected to speak frequently about process, and the data support this expectation.

As predicted, children in the AP used statements rather than questions in their speech. However, it had been expected that they would ask more questions for clarification and direction during RLA than was the case. This may have been due to the fact that, during RLA, teachers were very active in asking questions to determine the expect of children's understanding of basic concepts and rules as they related to the activities in which they were engaged. Like their teachers, AP children spoke frequently of process. In particular, during small group instruction, nearly

four-fifths of children's speech was related to process. This appears to be a direct outcome of the instructional procedure being used. It is also important to mention that nearly two-thirds of these children's speech, overall, indicated successful performance of a process operation.

The Piagetian Program

Since teachers in the PP did not espouse direct verbal instruction but rather an "inquiry" approach to learning, it was expected that they would frequently use indirect questions and statements. Surprisingly, and contrary to expectations, direct questions and statements were used most frequently. Furthermore, direct questions were more apt to be closed rather than open. In practice, the use of IQ and IS (and even DOQ) may be difficult to maintain. Young children's thinking is likely to be closely tied to their immediate actions upon objects, especially when these actions are mainly spontaneous and self-directed. It seems reasonable to expect, therefore, that teachers' conversation might become related to the inquiries of children about the identification and function of objects and events. From observation of the tapes this seemed to be the case and may have resulted in less use of questions for guesses, predictions, and checking than teachers had intended. It was the case that teachers most frequently asked questions such as, "Which piece is most sticky?", "Will the beachball fit into this suitcase?", or "Are all rocks smooth?". Occasionally, questions such as, "Can the clothespin be dropped into this box from this chair?" were asked. Although closed in form, such questions can be intellectually challenging and, hence, seen by teachers as having particular value. Teachers preference for DCQ may have been the results of immediate and ongoing aspects of children's learning and, therefore, under the circumstqances considered pragmatic and effective.

It was expected that teachers in the PP would speak frequently about process. Kamii and DeVries (1977) have commented that "simple abstraction" refers to the identification of observable properties of objects whereas "reflective abstraction" refers to relationships between and among objects (e.g., as in classification and seriation). Verbalizations associated with such thinking processes would be coded as "process utterances". Data indicate that, overall, teachers were nearly three times more likely to refer directly to content than to process. During small group instruction, however, the difference in proportions of process and content verbalizations was less than ten percent, favoring content. It is difficult to explain why there was such an emphasis on references

to content. The recommendation to teachers in Piagetian programs, endorsed by the teachers in this program, to facilitate children's "process" thinking by using well-timed comments or questions referring to process is clear (e.g., Copple et al., 1979; Kamii & DeVries, 1977). However, we must keep in mind that the proportions of verbalizations referring to process and content during SGI (46% and 54%, respectively) reflects very closely the objectives of instruction at this time. Also, that a quarter of teachers' verbalizations during RLA referred to process and may well have been effective in challenging children to reflect upon properties of objects and relationships among and between objects.

Like their counterparts in the AP, children in the PP most frequently used direct statements rather than ask questions. These children's references to process and content closely matched the pattern of such verbalizations by their teachers. Not surprisingly, it was during SGI that these children referred more frequently to successfully performed process operations.

On a final note, based on the findings of Alfren, Aries, and Oliver (1979), and Cherry (1975), teachers in both programs were expected to speak to boys more frequently than to girls. Whereas this was true for AP teachers, in general, teachers in the PP spoke about as frequently to girls as to obys. Compared to SGI, teachers in the AP spoke to boys much more frequently than to girls during RLA. There is evidence to suggest that children in the AP were especially encouraged to use the teacher as an important resource person during RLA to help in the successful completion of particular learning activities.

Effects of Instuction on Children's Understanding of Logical Concepts

The videotaping described in this paper occured during one year of a three year longitudinal study of the effects of instruction in three preschool programs on children's understanding of logical concepts; namely, classification, relations, and conservation (Lawton, 1987a and b). A question that can be asked is, are there any relationships between teacher and child verbalizations during SGI and RLA and learning outcomes in terms of chidlren's improved understanding of logical concepts? It might be expected that the objectives and organization of a program might have an effect on language use by teachers and children, and that, in turn, language used might have an effect on learning outcomes.

Only the learning outcome results for the Ausubelian and Piagetian program are referred to

here. The results from a third program, a community preschool, have no bearing on this study of language use since no videotaping was conducted in that program. There is only space here to refer to some of the more salient results from the longitudinal study. Results from five times of testing over a three year period of instruction are presented in Table 8. Testing at Time 3 occured during the period of videotaping and testing at Times 4 and 5 during the year following completion of videotaping.

Insert Table 8 about here

As in a previous study (Lawton et al., 1984), children quickly showed an understanding of dichotomous sorting, serial ordering, additive seriation, and serial correspondence, and therefore the results from these tests are not shown in Table 8. To briefly summarize, data in Table 8 clearly indicate that:

1. In general, children in the AP performed increasingly better than children in the PP over time on those tasks that require a successful completion of "process operations". The differences between the performance of AP children compared to children in the PP are quite marked by Time 3 of testing, and are more obvious by Times 4 and 5 of testing.

2. The superior performance of children in the AP can be attributed to instruction in high-order rules for processing information (as in SGI and further elaborated during RLA).

Taking the performance data and the patterns of teachers' and children's speech together, it does seem apparent that the AP teachers use of verbalizations referring to process is related to the improved level of children's understanding of logical concepts by Times 3, 4, and 5 of testing. It also seems reasonable to claim that the more frequent reference to process by AP teachers, compared to PP teachers was at least one important factor that contributed to the higher level of understanding of logical concepts by the AP children compared to children in the PP. Bruner (1960, p. 369) has mentioned that the young child need not manipulate the world of potentiality until instructional demands are made which result in at least the beginnings of propositionalism (that is, in the awakening of an understanding of process operations). The markedly improved peformance of AP children on logical concept tasks suggests that AP teachers' frequent reference to

process did make a demand which contributed to a qualitative change in AP children's thinking.

Conclusions

Observation of language used during classroom instruction gives some indication of the extent to which the language of instruction reflects the objectives of a program. If data on children's achievements related to instruction are also available, it becomes possible to examine possible relationships between the language and outcomes of instruction.

To a certain extent, the language of instruction used by teachers and children in the Ausubelian and Piagetian programs reflected the instructional objectives of each program, though there were some surprises. Teachers in the AP asked more questions, even during SGI, than had been expected. It had been supposed that direct instruction would consist, in great part, of statements describing and explaining objects and events, or procedures for manipulating objects and events. Observation of the tapes indicates that a questioning approach was frequently used by AP teachers, not only to ascertain whether children had understood the basic subject-matter concepts and the high-order skills (logical concepts) being presented, but also to get children actively involved in thinking about characteristics of objects, about relationships between and among objects, and in physically manipulating objects. This suggests that these teachers were aware of the importance of young children's active participation in learning.

Teachers in the PP referred much less to process than had been expected. They were more likely to refer to process during SGI than during RLA. Both teachers and children focused a great deal on specific characteristics of content. PP teachers also asked fewer indirect, or direct-open questions, and used fewer indirect statements than had been expected. It is of interest to note that, for both programs, teacher process questions almost invariably elicited children's reference to process or to a peformed process operation. However, the greater use of direct-closed questions by the AP teachers was significantly more effective in this respect. Teachers' use of direct questions in both programs can be seen as a positive aspect of both approaches to instruction since such questions were frequently used to seek information from children, or to prompt the seeking of information. Since preschool children are not expected to easily abstract either physical or relational properties of objects without reference to reality, direct questions seeking such information may be especially useful.

A unique aspect of the observational code used in this study is the examination of children's references to process and to their own performed process operations. Although these types of verbalizations are relatively simple to identify, their production by young children has not previously been systematically examined. Classroom verbal references to self-performed process operations, like overt behaviors during testing, can provide an indication of young children's operational thinking. It is clear that there is a strong relationship between the emphasis placed on references to process by teachers during instruction and children's references to process and to performed process operations. Data indicating improvements in children's peformance over time on tests of the understanding of logical concepts strongly support this interpretation.

References

Alfren, S. H., Aries, E. J., & Oliver, R. R. (1979). Sex differences in the interaction of adults and preschool children. Psychological Reports, 44, 115-118.

Ausubel, D. P., Novak, J. D., & Hanesian, H. (1978). Educational psychology: A cognitive view (2nd ed.), New York: Holt, Rinehart, & Winston.

Banta, T. J. (1972). Montessori: Myth or reality. In R. K. Parker (Ed.), The preschool in action: Exploring early childhood programs. New York: Allyn & Bacon.

Bingham-Newman, A. M., Saunders, R. A., & Hooper, F. H. Logical operations instruction in the preschool. Final Report--Hatch Research Project 142-1769, July 1st 1971 to August 30th, 1974. Madison: University of Wisconsin, Child and Family Studies Program.

Blank, M., Rose, S. A., & Berlin, L. J. (1978). The language of learning: The preschool years. New York: Grune & Stratton.

Bruner, J. S. (1960). The process of education. Cambridge, MA: Harvard Univerity Press.

Cherry, L. (1975). The preschool teacher-child dyad: Sex differences in verbal interaction. Child Development, 46, 532-535.

Cherry-Wilkinson, L., Clevenger, M., & Dollaghan, C. (1981). Communication in small instructional groups: A sociolinguistic approach. In P. Dickson (Eds.), Children's oral communication skills. New York: Academic Press.

Cooper, M. G. (1979). Verbal interaction in nursery schools. British Journal of Educational Psychology, 49, 214-225.

Copple, C., Sigel, I. E., & Saunders, R. (1979). Educating the young thinker: Classroom strategies for cognitive growth. New York: D. Van Nostrand.

Crump, C. (1970, April). Teachers, questions, and cognition. Educational Leadership, 657-666.

Dunn, L. M., & Dunn, L. M. (1981). Peabody Picture Vocabulary Test--Revised. Circle Pines, M: American Guidance Service.

Ershler, J., McAllister, A., & Saunders, R. (1977). The Piagetian derived curriculum: Theoretical framework, preschool objectives, and program description. Working Paper No. 205. Madison: Wisconsin Research and Development Center for Cognitive Learning.

Forman, G. E., & Hill, F. (1980). Constructive play: Applying Piaget in the preschool. Monterey, CA: Brooks/Cole Publishing Co.

Forman, G., & Kuschner, D. (1977). The child's construction of knowledge: Piaget for teaching children. Monterey, CA: Brooks/Cole.

Garvey, C. (1974). Requests and responses in children's speech. Journal of Child Language, 2, 41-63. (Great Britain).

Hohmann, M., Banet, B., & Weikart, D. P. (1979). Young children in action: A manual for preschool educators. High/Scope Educational Research Foundation, Ypsilanti, MI: The High/Scope Press.

Hunkins, F. P. (1972). Questioning strategies and techniques. Boston, MA: Allyn & Bacon.

Johnson, J. E., & Wanska, S. K. (1978, May 17-20). Characterizing teacher's beliefs and practices for distinguishing Piagetian influenced preschool programs. Paper presented at the 8th Annual Meeting of the Jean Piaget Society, Philadelphia.

Johnson, J. E., & Hooper, F. H. (1982). Piagetian structuralism and learning: Reflections on two decades of educational application. Contemporary Educational Psychology, 7, 217-237.

Kamii, C., & DeVries, R. (1977). Piaget for early education. In M. C. Day & R. K. Parker (Eds.), The preschool in action: Exploring early childhood programs (2nd ed.). Boston: Allyn & Bacon.

Kammi, C., & DeVries, R. (1978). Physical knowledge in preschool education: Implications of Piaget's theory. Englewood Cliffs, NJ: Prentice-Hall.

Karnes, M. B. (1973). Evaluation and implications of research with young handicapped and low income children. IN J. C. Stanley (Ed.), Compensatory education for children, ages 2-8, recent studies of educational intervention: Proceedings. Baltimore, MD: Johns Hopkins Press.

Kearsley, G. P. (1976). Questions and question-asking in verbal discourse: A cross-disciplinary review. Journal of Psycholinguistic Research, 5, 4.

Lawton, J. T. (1987a, in press). The Ausubelian preschool classroom. In J. Roopnarine & J. E. Johnson (Eds.), Approaches to early childhood education.

Lawton, J. T. (1987b) The development of logical concepts in three preschool program: A longitudinal study (in preparation).

Lawton, J. T., Hooper, F. H., Saunders, R. A., & Roth, P. (1984). A comparison of logical conept development in three preschool programs. Human Learning, 3, 143-164.

Mann, M. (1974). Developmental learning process. A performance-based early childhood-special education teacher preparation program. University of Virginia: Monograph No. 5.

Mehan, M. (1979). "What time is it, Denise?": Asking known information questions in classroom discourse. Theory into Practice, 18, 285-294.

Miller, L. B., & Bizzel, R. P. (1983). Long-term effects of four preschool programs: Sixth, seventh, and eighth grades. Child Development, 54, 727-741.

Miller, L. B., & Dyer, J. L. (1975). Four preschool programs: Their dimensions and effects. Monographs of the Society for Research in Child Development, 40(5-6).

Mishler, E. G. (1975a). Studies in dialogue and discourse: An exponential law of successive questioning. Language in Society, 4, 31-52.

Mishler, E. G. (1975b). Studies in dialogue and discourse: II. Types of discourse initiated by and sustained through questioning. Journal of Psycholinguistic Research, 4, 2.

Shatz, M., & Gelman, R. (1973). The development of communication skills: Modifications in the speech of young children as a function of listener. Monographs of the Society for Research in Child Development, 38(5, Serial No. 152).

Sigel, I. E., & Cocking, R. R. (1977). Cognition and communication: A dialectic paradigm for development. In M. Lewis & L. A. Rosenblum (Eds.), Interaction, conversation, and the development of language. New York: Wiley.

Sigel, I. E., & Saunders, R. (1979). An inquiry into inquiry: Question asking as an instructional model. In L. G. Katz (Ed.), Current topics in early childhood education (Vol. 2). Norwood, NJ: Ablex.

Smothergill, N. L., Olson, F., & Moore, S. G. (1971). The effects of manipulation of teacher communication style in the preschool. Child Development, 42, 1229-1239.

Taba, M. (1967). Teacher's handbook for elementary social studies (introduction ed.). Reading, MA: Addison-Wesley.

Taba, M., & Elzey, F. F. (1964). Teaching strategies and thought processes. Teacher's College Record, 65, 524-534.

Weikart, D., Epstein, A., Schweinhart, L., & Bond, J. T. (1978). The Ypsilanti preschool curriculum demonstration project: Preschool years and longitudinal results. Ypsilanti: High/Scope Press.

Zimmerman, B. J., & Bergan, J. R. (1971). Intellectual operations in teacher question-asking behavior. Merrill-Palmer Quarterly, 71(1), 19-26.

Zimmerman, B. J., & Rosenthal, T. L. (1974). Observational learning of rule-governed behavior by children. Psychological Bulletin, 81, 29-42.

Table 1. Predictions of Teacher's and Children's Use of Verbalizations

Teachers.

Ausubelian Program Teachers (APT)

	WS[1]	SGI[1]	RLA[1]
Q vs S[3]	< *[2]	< *	> *
DQ vs IQ	> *	> *	> *
DS vs IS	> *	> *	> *
P vs C	> *	> *	> *
G vs S	> **	> **	< *
B vs G	> *	> *	> *

Piagetian Program Teachers (PPT)

	WS	SGI	RLA
Q vs S	> *	> *	> *
DQ vs IQ	< **	< **	< **
DS vs IS	< **	< **	< **
P vs C	< *	< *	< *
G vs S	< *	< *	< *
B vs G	> **	> **	> **

Ausubelian Program (APT)

	SGI vs. RLA
Q vs S[4]	< *
P vs C	n.s. *

Piagetian Program Teachers (PPT)

	SGI vs RLA
Q vs S	n.s. *
P vs C	n.s. **

APT vs PPT

	WS	SGI	RLA
Q vs S	< **	< *	n.s. *
P vs C	n.s. **	n.s. **	n.s. **

Children.

Ausubelian Program Children (APC)

	WS	SGI	RLA
	< *	< *	> **
	> *	> *	> *
	> *	> *	> *
	> *	> *	> *
	< *	< *	< *

Piagetian Program Children (PPC)

	WS	SGI	RLA
	< *	< *	> **
	> *	> *	> *
	> *	> *	> *
	< *	< *	> **
	< *	< *	< *

Ausubelian Program Children (APC)

	SGI vs RLA
	< **
	n.s. *

Piagetian Program Children (PPC)

	SGI vs RLA
	< **
	n.s. **

APC vs PPC

	WS	SGI	RLA
	< **	< *	n.s. **
	n.s. **	n.s. **	n.s. *

Note:

1. SGI: Small Group Instruction; RLA: Relation Learning Activities; WS: Whole Session Data
2. *Prediction supported; **Prediction not supported.
3. Less than < More than. For example, at (4), in general, Ausubelian program teachers will make more statements than ask questions for whole session (WS) and small group instruction (SGI), but will ask more questions than make statements during related learning activities (RLA).
4. Comparisons read, for example in this case, "It is predicted that APT will ask more questions than make statements during RLA than during SGI."

Table 2

Subject Characteristics by Program

Program	N	Sex M	Sex F	Mean Age (Months)	Range (yr/mo)	PPVT (Mean Raw Score)	SD
Ausubelian	10	4	6	4 yrs 2 mo	3^8 - 4^8	42.2	14.6
Piagetian	10	5	5	4 yrs 1 mo	3^5 - 4^8	36.7	15.9

Table 3. Categories of Verbalizations

Category	Sub-Category	Description
Questions: According to a taxonomy by Kearsley (1976)	Indirect Questions (IQ)	1. A question containing an embedded partial interrogative phrase: e.g., "I wonder why it turns green?" 2. A question containing a missing word: e.g., "We can make green from blue and _____?"
	Direct Closed Questions (DCQ)	1. Questions answered in terms of previously fixed alternatives: e.g., "Is it rough or smooth?"; "Which of these chairs belongs to Mama Bear?"; "Where is the five?"
	Direct Open Questions (DOQ)	These questions provide no cues as to appropriate responses: e.g., "When we are packed how shall be go to the beach?"
	Reminding Questions (RQ)	Used by teachers to prompt children's recall or recognition of previously encountered objects or events: e.g., "Remember when we visited the lake and it was frozen?"
Statements: (Mann, 1974)	Direct Statements (DS)	e.g., "An orange can roll like a ball."; "Look at the wheels go round."; "I'm not certain how it will turn out."
	Indirect Statements (IS)	e.g., "I guess maybe we need to blow a bit lower."
	Reminding Statements (RS)	e.g., "I remember that heavy things went down (on the scale)."
That referred to Content or Process		
Content	References to subject matters concepts and facts: e.g., "Gilberto could not see the wind, but he could feel it on his face." (physical knowledge); and, "Numbers come in differentshapes." (number concepts).	
Process	References to information processing skills: 1. ORDERING. "First you plant the seed, then it grows into a flower." 2. CLASSIFICATION. "These (indicating one row in a matrix)are all red, and these (an intersecting column) are all Legos." 3. CONSERVATION. One of two identical amounts of liquid is paired in a different shaped container--"Do we have as much juice here as here?" 4. PROBLEM SOLVING. Questions and statements referring to predictions and possible solutions. "How can I change this balloon so that it will be like it was before?" 5. LABELING. "What do we call this?"; "If we put all these together, what can we call this group?" 6. OTHER OPERATIONS. For example, Q's and S's to do with reading and counting. "It says, yellow."; "We can count, one, two, three, and four."	
And were either General or Specific		
General	References to general concepts and high-order skills: e.g.,"Numbers have a special order when we are counting."	
Specific	References to particular objects and events: e.g., "Does this one come after the four?"; "What number do we call it?"	

Table 4. Verbal Utterance Code Sheet

Tape No._____
Date: _____

School: A P
Grouptime/Activities

Name of Coder:_____
Teacher:_____ Page:
Children:_____

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Teacher	Q																				
	S																				
	P																				
	C																				
	G																				
	S																				
	INIT[1]																				
Child	Q																				
	S																				
	P																				
	C																				
	G																				
	S																				
	INIT[2]	/	/	/	/	/	/	/	/	/	/										

NOTE: Q = Question; S = Statement; P = Progress; C = Content; G = General;
S = Specify; INIT = Initials of teacher or child
INIT[1] = Initials of child addressed
INIT[2] = top half, initial of child speaker; lower half, initial of teacher or child addressed

Table 5

Reliability Measures: Percent Agreement for Each Sequential Variable on 4 Tapes

Variable	Mean % Agreement
Speaker	98.4
to-whom	95.3
questions	96.2
dir. open questions	97.4
dir. closed questions	88.2
statements	99.4
definite statements	100.0
process	91.7
ordering	95.7
classifying	89.6
problem solving	96.6
labeling	96.0
counting and reading	100.0
content	91.2
operations	90.0
no operations	95.6
general	94.1
specific	99.9

Table 6
Whole Session Data as Percentages of Utterances by School, Speaker, and Categories

School	Total Utterances	Questions(1) & Statements(2)				Process(3) & Content			General & Specific		Performed Operation	To Whom	
Australian Teacher	60	DO 20 DC 36 I 0 R 1 All 57		D 41 IS 1 R 1 43		O 6 Cl 10 PS 6 L 32 Op 7 All 61	39		4	96	22	Girls 19	Boys 30
Australian Children	40	DO 2 DC 3 I 0 R 0 All 5		D 95 IS 0 R 0 95		O 4 Cl 9 PS 5 L 41 Op 13 All 72	28		0	100	65	Teacher 90	Peers 9
Bicultural Teacher	53	DO 22 DC 41 I 0 R 1 All 64		D 34 IS 2 R 0 36		O 6 Cl 6 PS 5 L 19 Op 0 All 36	64		0	100	18	Girls 33	Boys 39
Bicultural Children	47	DO 6 DC 6 I 0 R 0 All 12		D 88 IS 0 R 0 88		O 3 Cl 5 PS 3 L 25 Op 0 All 36	64		0	100	33	Teacher 79	Peers 20

NOTE: Performed operations percentages are a fraction of total utterances. Percentages in the "To Whom" category are also fractions of total utterances.

(1) DO = Direct open question; DC = Direct closed question; I = Indirect question; R = Reminding questions
(2) D = Definite statements; IS = Indefinite statements; R = Reminding statements.
(3) O = Ordering; Cl = Classification; PS = Problem solving; L = Labeling; Op = Operations--conservation, counting, teaching.

Table 7
Percentages of Utterances by School, Speaker, and Categories at Group Time and Related Learning Activities

Speaker	Total Utterances	Questions(1) & Statements(2)				Process(3) & Content				General & Specific		Performed Operation	To Whom	
Ausubelian Teachers	63 (58)	DO 16 (23)	D 53 (33)	O 3 (7)										
		DC 26 (42)	IS 1 (0)	CI 8 (11)										
		I 1 (0)	R 1 (1)	PS 6 (6)										
		R 2 (1)		L 32 (33)										
				Op 11 (5)									Girls	Boys
		All 45 (66)	55 (34)	All 60	(62)	40	(38)			7 (2)	93 (98)	26 (20)	10(25)	12(42)
Ausubelian Children	37 (42)	DO 1 (2)	D 97 (95)	O 4 (5)										
		DC 2 (3)	IS 0 (0)	CI 10 (8)										
		I 0 (0)	R 0 (0)	PS 6 (4)										
		R 0 (0)		L 40 (41)										
				OP 19 (10)									Teacher	Peers
		All 3 (5)	97 (95)	All 79	(68)	21	(32)			1 (1)	99 (99)	71 (62)	97(86)	3(14)
Piagetian Teachers	55 (51)	DO 22 (22)	D 36 (32)	O 5 (6)										
		DC 40 (41)	IS 1 (2)	CI 8 (5)										
		I 0 (0)	R 0 (1)	PS 7 (3)										
		R 1 (2)		L 26 (11)										
				Op 0 (0)									Girls	Boys
		All 63 (65)	37 (35)	All 46	(25)	54	(75)			2 (0)	98(100)	23 (13)	20(45)	33(46)
Piagetian Children	45 (49)	DO 4 (7)	D 89 (87)	O 4 (3)										
		DC 7 (6)	IS 0 (0)	CI 9 (2)										
		I 0 (0)	R 0 (0)	PS 5 (1)										
		R 0 (0)		L 31 (20)										
				Op 0 (1)									Teacher	Peers
		All 11 (13)	89 (87)	All 49	(27)	51	(73)			1 (0)	99(100)	45 (24)	91(70)	9(30)

NOTE: Group Time percentages are shown first followed by Learning Activity percentages in parentheses.
Performed Operation percentages are a fraction of total utterances.
Percentages in the "To Whom" category may be a fraction of total utterances.

(1) DO = Direct open question; DC = Direct closed question; I = Indirect question; R = Reminding questions
(2) D = Definite statements; IS = Indefinite statements; R = Reminding statements.
(3) O = Ordering; CI = Classification; PS = Problem solving; L = Labeling; Op = Operations--e.g., conservation, counting.

Table 8

Changes in Percentage of Children Passing on Nine Tasks at Five Times of Testing